

WHAT IS CLAIMED IS:

1. A composition of matter useful to stimulate growth of plants, such composition being an aqueous solution and comprising the following components dissolved in an aqueous medium:

- (a) a carbon skeleton/energy component
- (b) a macronutrient component
- (c) a micronutrient component

the carbon skeleton/energy component (a) being one or more organic compounds which are water soluble and which are assimilable by plants to provide energy required by metabolism of the plant and to provide carbon skeleton precursors for synthesis of proteins and other plant components,

the macronutrient component (b) comprising water soluble assimilable compounds of the elements nitrogen, phosphorus, potassium and calcium,

the micronutrient component (c) comprising water soluble assimilable compounds of the elements zinc, iron and manganese,

each of said components (a), (b) and (c) being present in quantity sufficient to perform its intended function when applied to a plant directly as by foliar spraying, application to roots of the plant or injection or indirectly as by way of application to pollen, application to seeds of the plant or application to the soil in which the plant grows, such quantities being present in proportions consistent with overall usage of the composition to stimulate growth of the plant, such proportions also being suitable to repeated applications when applied

as a foliar spray at different stages of growth of the plant.

5 2. The composition of Claim 1 including also a vitamin/cofactor component (d) selected and in a quantity to stimulate energy production and biosynthesis by the plant such that the burden of energy production and carbon skeleton production by component (a) is shared by photosynthesis and other biosynthetic paths of the plant, the amount of
10 component (d) and of its sub-components being consistent with metabolism and biosynthesis of the plant.

15 3. The composition of Claim 1 or Claim 2 including also a complexing agent (e), such complexing agent acting to facilitate transfer of other components into the cell structure of the plant.

4. The composition of Claim 1 wherein component (a) is a sugar or mixture of sugars.

20 5. The composition of Claim 4 wherein the sugars are in the form of molasses.

6. The composition of Claim 1 wherein component (b) includes water soluble, assimilable magnesium and sulfur and component (c) includes water soluble, assimilable copper, boron, molybdenum and cobalt.

25 7. A foliar spray in accordance with any of Claims 1 to 6 which is a stable solution free of solids which would interfere with passage of the solution through a spray nozzle.

8. The composition of Claim 7 in which the nitrogen in component (b) consists of substantial proportions each of trivalent nitrogen and pentavalent nitrogen.

5 9. A method of assisting growth of a foliar plant or of a crop produced by such plant during a period of physiological stress which comprises applying to the foliage of the plant, at a time preceding, at the onset of or before substantial irreparable damage is caused by such stress, an aqueous solution,
10 substantially free of undissolved solids, of the following water soluble components:

- (a) a carbon skeleton/energy component
- (b) a macronutrient component
- (c) a micronutrient component

15 the carbon skeleton/energy component (a) being one or more organic compounds which are water soluble and which are assimilable by plants to provide energy required by metabolism of the plant and to provide carbon skeleton precursors for synthesis of proteins
20 and other plant components

the macronutrient component (b) comprising water soluble assimilable compounds of the elements nitrogen, phosphorus, potassium and calcium,

25 the micronutrient component (c) comprising water soluble assimilable compounds of the elements zinc, iron and manganese,

each of said components (a), (b) and (c) being present in quantity sufficient to perform its intended function when applied by foliar spraying,
30 such quantities being present in proportions

consistent with overall usage of the composition to stimulate growth of the plant.

5 10. The method of Claim 9 wherein said aqueous solution also contains dissolved therein a vitamin/cofactor component selected and in a quantity to stimulate energy production and biosynthesis by the plant such that the burden of energy production and carbon skeleton production by component (a) is shared by photosynthesis and other biosynthetic paths of the
10 plant, the amount of component (d) and its sub-components being consistent with metabolism and biosynthesis of the plant.

15 11. The method of Claim 9 in which the composition contains dissolved therein a complexing agent which acts to facilitate transfer of other components into the cell structure of the plants.

20 12. The method of Claim 10 in which the composition contains dissolved therein a complexing agent which acts to facilitate transfer of other components into the cell structure of the plants.

25 13. The method of any of Claims 10 to 12 in which the macronutrient component (b) includes water soluble, assimilable magnesium and sulfur and the micronutrient component (c) includes water soluble, assimilable copper, boron, molybdenum and cobalt.

30 14. In the control of pathogenic attack upon plants where the plants mount a natural defense against such attack and in the process of such defense a stress is placed upon the plants by reason of the need to draw upon reserves of carbon skeleton and/or energy, the improvement which comprises applying to the plants, or to the soil in which the plants grow or to seeds

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5 from which the plants are grown, at or prior to the
onset of such attack or at an early stage of such
attack an aqueous solution of a water soluble,
assimilable carbon skeleton/energy substance, such
10 solution containing also a complexing agent dissolved
therein which acts to promote transfer of the carbon
skeleton/energy component into the cell structure of
the plants, such application being conducted at a
time and in an amount sufficient to assist the plants
substantially in mounting such natural defense.

15 15. The method of Claim 14 wherein the solution
contains also a macronutrient component and a micro-
nutrient component dissolved therein, each such
component being present in sufficient amount to
assist substantially in such defense.

16. The method of Claim 15 wherein the solution also
contains dissolved therein a vitamin/cofactor
component in sufficient amount to assist
substantially in promoting such defense.

20 17. The method of Claim 16 in which the solution is
applied as a foliar spray.

18. The method of Claim 16 in which the solution is
applied to the soil in which the plants grow.

25 19. The method of any of Claims 14 to 18 in which
the solution is applied before the onset of or early
during a natural stress period in the growth of the
plants or of a crop produced by the plants.

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20. A method of separating pollen from anthers which comprises agitating anthers on a screen of a mesh size suited to allow passage through the screen of pollen grains separated from the anthers, meanwhile
5 subjecting the anthers to a gentle abrasive action sufficient to break open the anthers and free the pollen grains but such as to avoid substantial damage to the pollen grains, such abrasion resulting in
10 breaking open of the anthers and liberating the pollen grains, such agitation serving to cause the pollen grains to pass through the openings in the screen, then collecting the separated pollen.

21. A method of treating pollen to enhance its use for pollination which comprises providing pollen
15 grains separated from the bulk of the anthers which normally accompany the pollen, then coating the grains of pollen with a nutrient solution comprising a carbon skeleton/energy component which is water soluble and is assimilable by plants and also
20 comprising a water soluble complexing agent.

22. The method of Claim 21 in which the pollen is coated with a mixture of such nutrient solution containing also a soluble vitamin/cofactor component.

23. The method of Claim 22 in which the vitamin/cofactor component is derived from yeast.

24. A pollen preparation suitable for pollination of plants which comprises pollen grains coated with a carbon skeleton/energy composition which is
30 assimilable by plants to support production of carbon skeletons and to supply energy needed by the plant, such coating also including a complexing agent and a vitamin/cofactor component.

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25. The pollen preparation of Claim 24 in which the vitamin/cofactor component is derived from yeast.

26. A method of pollination which comprises applying to the flowers of plants the pollen preparation of Claim 24.

27. The method of Claim 26 in which the application is carried out by exposing bees to the pollen preparation of Claim 24 and causing pollination by way of the bees.

28. The method of Claim 26 wherein the application is carried out by aerial spraying.

29. A method of disrupting the egg laying activity of insects which are attracted by olfactory stimuli to the crop of a plant and which lay their eggs in such crop and cause damage to the crop when the eggs are hatched, said method comprising applying to the foliage of such plant an attractant comprising an aqueous solution of an assimilable carbon skeleton energy component, a macronutrient component, a micro-nutrient component and a complexing agent.

30. The method of Claim 29 in which the attractant is an emulsion of a crop oil in the composition of Claim 1.

31. The method of Claim 29 in which the insect is the navel orange worm.

32. In the control of frost damage to plants or their crops wherein micro-organisms are present which function as an ice nucleating factor and thereby exacerbate frost damage, the improvement which comprises applying to the surfaces of the plants

infested with ice nucleating micro-organisms a composition as in Claim 1 which also includes micro-organisms which are antagonistic to said ice nucleating micro-organisms.

5 33. The method of Claim 32 wherein such antagonistic micro-organisms are included in said composition prior to application to the surfaces of plants.

10 34. A method of treating seeds to promote growth of plants to be grown from the seeds which comprises coating the seeds with the composition of Claim 1.

35. The method of Claim 34 in which the seeds are treated, prior to such coating, to remove pathogens from their surfaces.

15 36. The method of Claim 31 in which the coating includes micro-organisms which act on the soil in which the seeds are to be planted to promote germination of the seeds and growth of resulting plants.

37. Seeds coated with composition of Claim 1.

20 38. A method of treating roots of plants which comprises applying to the roots the composition of Claim 1.

25 39. The method of Claim 38 in which said composition also contains micro-organisms which act on the soil in which the roots are planted to promote growth of the plants.

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41. The method of Claim 40 in which said composition also contains micro-organisms which have a beneficial effect upon the soil or which act as antagonists to pathogens in the soil.